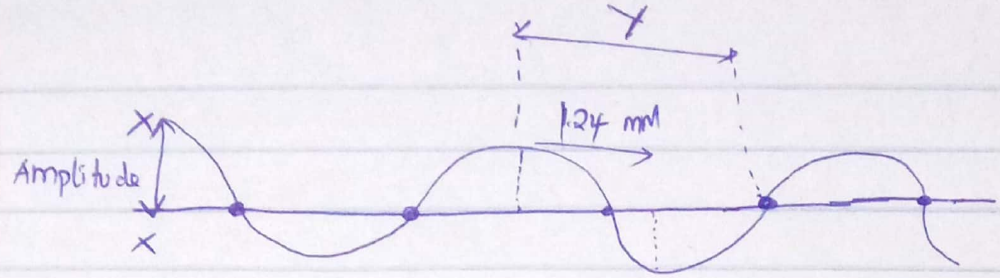
NAME: VERONICA GONZALEZ

1.



a) 5 nodes (represented by dots on the diagram)
(b) represented by (x – x) on the diagram
(c) Wavelength represented by Y (1.24x2) = 2.48mm.

2. $F = c/\lambda = \frac{3.0\times10^{8}}{0.5\times1\times10^{-6}} \simeq 6.0\times10^{14}$ Hz

where F = Frequency
c = speed of light = wave speed.
λ = Wavelength.

3. (a) $\lambda = c/F = \frac{3.0\times10^{8}\ m/s}{25\times10^{8}\ s^{-1}} = 1.2\times10^{-10}$ M.

(b) Yes. X-ray detector detects short wavelengths ranging from 1.0×10^{-8} M to 1.0×10^{-12} M where 1.2×10^{-10} M wavelength above ranges.

4. $F = 1/t = 1/10.5\times10^{-15} = 9.524\times10^{13}$ Hz.

$\lambda = c/F = \frac{3.0\times10^{8}\ m/s}{9.524\times10^{13}\ s^{-1}} = 3.15\times10^{-6}$ M.

5 Distance in Meters (m). (93000000 x 1609.344)
1.497×10^{11} M.

$F = c/\lambda = \frac{3.0\times10^{8}\ m/s}{1.497\times10^{11}\ M} = 2.0\times10^{3}$ Hz

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$E = \frac{1}{F} = \frac{1}{2.0 \times 10^{-3}} = 499\,s = 4.99\ M/s$

6 $F = \frac{c}{\lambda} = \frac{3.0 \times 10^{8}\ m/s}{0.2\ m} = 1.5 \times 10^{9}\ Hz$

7 A: Short wavelength in A results into higher frequency.

8 $\lambda = \frac{hc}{E} = \frac{6.62607 \times 10^{-34} \times 3.0 \times 10^{8}}{94\,000}$

$= 21125 \times 10^{-31}\ M$

where h = planckls Constant.
E: photon Energy

Type of radiation: Infrared electromagnetic radiation

9. Types of radiations in order of Increasing energy per photon

FM Music station → Infrared → green Light → X ray.

10 Converting warelength of 10.0 cm to Frequency in Hz.

$\frac{10.0}{100} = 0.1\ M.$

(a) $F = V/\lambda$ V = speed of Light = 3.0×10^8 m/s

$\lambda = 0.1\ M$

$F = \frac{3.0 \times 10^8\ M/s}{0.1\ M} = 3.0 \times 10^9\ Hz.$

(b) energy in One photon of Microware radiation.

$E = hf = hc/\lambda$

h = planks Constant = 6.63×10^{-34} Js

$6.63 \times 10^{-34}\ Js \times 3.0 \times 10^9 \simeq 19.89 \times 10^{-25}\ J$

(c) energy in one Mole.

1 mole = Avogadro's Constant x 6.0×10^{23} Particles

$6.0 \times 10^{23} \times 19.89 \times 10^{-2} \simeq 1.1934 \times 10^{-5}\ J/mol$

11 n=4 to n=3

Reason: Warelength as frequency decreases lowest frequency has longest warelength.

12. (a) Absorb

(b) emit.

(c) absorb

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13 (a) wavelength $= \frac{V}{F} = \frac{3.0\times10^{8}\ m/s}{1.141\times10^{14}}$

$= 2.629\times10^{-6}\times10^{9}$

$= 2.629\times10^{3}\ nm$.

(b) In the Radio waver region.

(c) $\frac{1}{\lambda} =$ Atomic no. $R\left(\frac{1}{n_1^2} - \frac{1}{n_f^2}\right)$

$\frac{1}{2.629\times10^{-6}} = 1\times 1.074\times10^{7}\left(\frac{1}{x^2} - \frac{1}{9}\right)$

$380372.765 = \frac{1.074\times10^{7}}{x^2} - 1193333.33$

$1573706.098 = \frac{1.074\times10^{7}}{x^2}$

$\sqrt{1573706.098x^2} = \sqrt{1.074\times10^{7}}$

$\frac{1254.47\,x}{1254.47} = \frac{3271.085}{1254.47}$

$x = 4$.

14. $\Delta E = -RH\left(\frac{1}{n^2_{final}} - \frac{1}{n^2_{inital}}\right)$.

$\Delta E = -$

(a) $1.07\times10^{7}\left(\frac{1}{12} - \frac{1}{92}\right)$

$1.07\times10^{7}\times 0.859 = 6561\ 3.03\times10^{-26}$

wavelength:

$E = hc/\lambda$.

$\frac{3.03\times10^{-26}}{6561} = \frac{6.63\times10^{-34}\times 3.0\times10^{8}}{\lambda}$.

$\lambda = 3.03\times10^{-26}$.

wavelength $= 656.1\ nm$.

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14) (b) $R_H \left(\frac{1}{n^2_{final}} - \frac{1}{n^2_{Initial}} \right)$

$1.07 \times 10^7 \left(\frac{1}{3^2} - \frac{1}{5^2} \right)$

$1.07 \times 10^7 \left(\frac{1}{9} - \frac{1}{25} \right)$

$= 1.55 \times 10^{20}$ joules

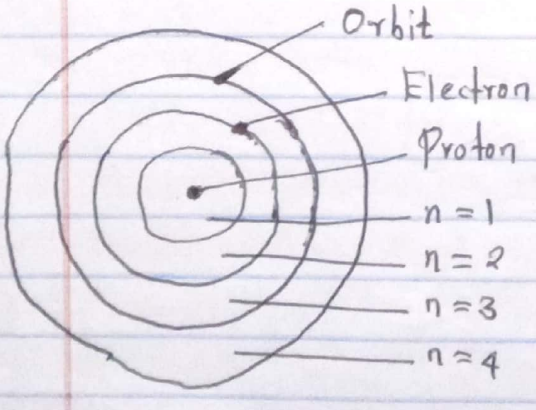
$E = \frac{hc}{\lambda}$

$1.55 \times 10^{20} = \frac{6.6310^{34} \times 3.0 \times 10^8}{\lambda}$

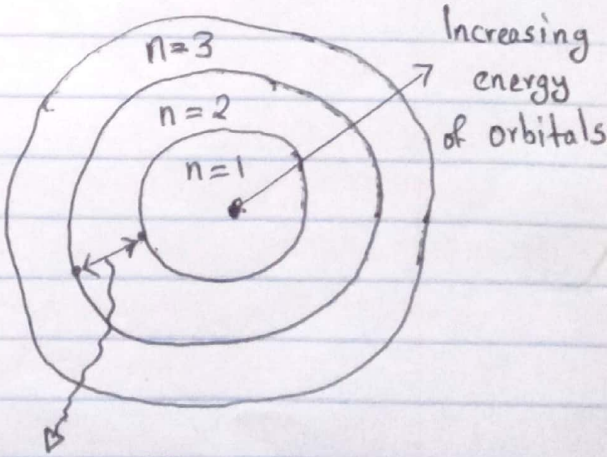
$\lambda = 1281.5$

15 Bohr Model describes the Particle behaviour of an electron. This Model does not give Information about quantum number while Quantum Model describes the ware Particle quality of an electron. This Model explains the quantum numbers.

Bohr Model



Quantum Model



A photon is emitted with energy $E = hf$

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16 An s orbital is spherical with the nucleus of its centre, a P-orbital is dumbbell-shaped and four of the five d orbitals is like an elongated dumbbell with a doughnut around its Middle.

17 The Angular Momentum Quantum Number (l) which describes the general shape or region an electron occupies its orbital shape.

18 The Spin Quantum numbers (m_s) with two possible values of $+\frac{1}{2}$ or $-\frac{1}{2}$.

19 As the value of an orbital ~~decreases~~ increases, the number of orbitals in a given subshell increases and the shapes of the orbitals become more complex.

20

n	Possible values	orbital labels
1	0	1s
2	0, 1	2s, 2p
3	0, 1, 2	3s 3p 3d
4	0, 1, 2, 3	4s 4p 4d 4f

21

l	M_l
0	0
1	-1, 0, 1
2	-2 -1, 0, 1, 2
3	-3 -2 -1, 0, 1, 2 3

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22. Sets of quantum numbers that describe actual orbitals.

C and d.

b is non existing because its Angular Momentum is 3 and not 4.

a is also non existing because M_s is always $-\frac{1}{2}$ or $+\frac{1}{2}$ and hence cannot be zero

23

l	Orbital	possible number of electrons
0	1	2
1	3	6
2	5	10
3	7	14

24 a) 25 orbitals.

b) An integer called the principal Quantum number, also designated by the symbol n. It is used to label each orbital.

c) 2 electrons.

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25 Quantum number associated with orbitals in the 2p subshell $n=2$, $l=1$ M_l $-1, 0, +1$

3s subshell $n=3$

4d subshell $n=4$ $l=2$ $M_l = -2, -1, 0, +1, +2$

4f subshell : $n=4$, $L=3$

$M_l = +3, +2, +1, 0, -1, -2, -3$

1s subshell - $n=1$

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